REALIZING NEW POSSIBILITIES

Modern hybrid solution for hydropower

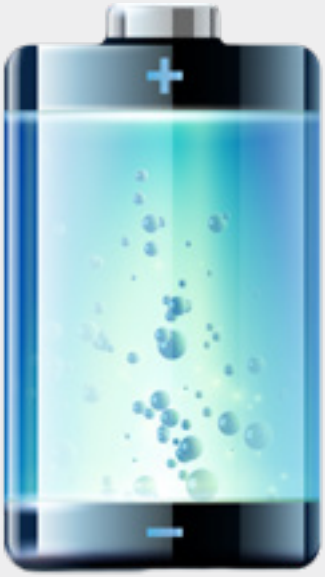
At a time when power generation based on fossil resources is being replaced by a carbon-free renewable electrical energy production, a compromise between the needs of the present and responsibility to future generations has to be found. In addition to structural changes, there are many market challenges to address. Issues such as market liberalization, energy prices, base- and peak-load capacity, the impact of weather, and smart metering technology must all be resolved.

How can we solve these challenges? The ideal approach is a combination of the best features of all systems – a hybrid solution. Today, examples of hybrid solutions include smart watches (IT and the mechanical wristwatch) or hybrid cars (battery and internal combustion). For the bulk power industry, hybrid solutions are defined as a combination of one or more generation technologies involving at least one renewable energy source and an energy storage system. This ensures maximum supply reliability and security of energy supply.

In addition to the large-scale hybrid solution, ANDRITZ Hydro is implementing hybrid approaches for our core products and services. For low-head hydropower plants, a reconsideration of the traditional operation approach is necessary. New demands require fast response times, frequent load changes, frequency regulation, and extended operational ranges. ANDRITZ Hydro is now offering a new hybrid solution that integrates a battery storage system into a hydropower plant – HyBaTec.

HYBATEC – THE SOLUTION

HyBaTec is a hybrid energy solution combining a hydro turbine generator unit with a battery. Compared to a conventional hydro application – and depending on the size of the battery – the operational range can be extended up to +/- 25%.



Along with the existing run-of-river operation mode, other operational modes and additional grid services are possible using the HyBaTec solution. Faster response times and very flexible operation due to the interaction of the generation unit and the battery will be available without restrictions resulting from electrical, mechanical or hydraulic limitations.

The battery can be either installed in a container in order to be mobile or can be integrated in cubicles directly within the hydropower plant buildings. In any event, the battery will be integrated into the electrical

TO KNOW:

A hybrid energy system provides:

- Better energy security
- Improved grid support by providing/releasing storage capacity to compensate for variable output resources
- New opportunities for energy market participation such as base load, peak load and balancing markets
- Extension of equipment lifetimes by reducing mechanical stress

power plant as well as in the control system to optimize revenue from the system. The ANDRITZ Station Controller (ASC) includes the energy management system and manages both the turbine and the battery.

"HyBaTec is offering new possibilities to improve the economic feasibility of your hydropower asset."

The system can be applied to "greenfield" applications as well as retrofitted to existing facilities, covering battery capacities from 100 kWh up to 10 MWh. Our hybrid solution is able to increase or keep the operational flexibility of your hydropower plant with no or reduced storage basins.

Over recent years some hybrid projects have already been realized using different combinations of wind, solar, hydropower, or batteries.

Gorona del Viento, Spain – For this Canary island, which is home to about 5,000 families, an 11.5 MW wind farm was combined with a hydropower plant to compensate for the short-term volatility and guarantee a carbon-free energy supply. ANDRITZ Hydro provided the Pelton turbines for this project.

Kidston, Australia – This installation features a 270 MW solar farm combined with a 250 MW pumped storage plant to compensate for any volatility in output as well as up to eight-hour of night time operations in the absence of sunlight. ANDRITZ Hydro is supplying the electro-mechanical equipment for the pumped storage elements of this plant.

Hornsdale Power Reserve, Australia – A 100 MW battery plant will compensate for grid volatility and provide energy for 30,000 homes for about one hour. The battery plant was built by Tesla over a period of just 100 days.

AUTHOR

Thomas Eiper, Jens Päutz
hydronews@andritz.com